DOCUMENT RESUME

ED 290 497 IR 052 269

AUTHOR	Line, Maurice B.
TITLE	Measuring the Performance of Document Supply Systems.
INSTITUTION	United Nations Educational, Scientific and Cultural Organization, Paris (France). General Information Programme.
REPORT NO	PGI-87/WS/21
PUB DATE	Oct 87
NOTE	111p.; Prepared by the International Federation of Library Associations International Office for Universal Availability of Publications.
AVAILABLE FROM	Division of the General Information Programme, Unesco, 7 Place de Fontenoy, 75700 Paris, France.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Cost Effectiveness; *Evaluation Methods; *Information Dissemination; International Programs; Measurement Techniques; Paper (Material); Relevance (Information Retrieval); Selective Dissemination of Information; Supplies; User Needs (Information); User Satisfaction (Information)
IDENTIFIERS	*Performance Measures

ABSTRACT

Produced by Unesco as part of its program designed to help member states develop national information systems, including libraries, information services, and archives, this manual is a guide to document supply measurement techniques that are applicable to a wide range of countries. The first of seven chapters considers the objectives, nature, and limitations of performance measures and factors affecting the demand for document supply, and the second focuses on fill rate, or the proportion of document requests that are met, and the problems associated with meeting user needs. The third chapter deals with the various operations involved in document requesting, processing, and supply, and with the importance of timeliness in meeting requests. User satisfaction as opposed to the concept of fill rate is discussed in the fourth chapter, while the fifth considers a number of less significant measures including the volume of demand, the range of resources available, the ability to accept blind requests, the robustness and flexibility of the system, ease of use, quality, minimal damage and loss, balance and fair distribution of supply, capacity to serve different sectors, and ease of monitoring. The sixth chapter analyzes costs in terms of measuring efficiency of performance, and the final chapter provides guidelines for practical measurement of performance. A list of 45 references is included. (CGD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED290497

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

PGI-87/WS/21

Measuring the performance of document supply systems

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

C.Coudert-Schklowski

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

General Information Programme and UNISIST

United Nations Educational
Scientific and Cultural Organization

Paris, 1987

IR052269

BEST COPY AVAILABLE

Original : English

PGI-87/WS/21
Paris, October 1987

Measuring the performance of document supply systems

Prepared by

the IFLA International Office for UAP

General Information Programme and UNISIST

United Nations Educational,
Scientific and Cultural Organization

Recommended catalogue entry :

Measuring the performance of document supply systems / prepared by the IFLA International Office for UAP /for the/ General Information Programme and UNISIST. - Paris : Unesco, 1987. - viii, 99 p. ; 30 cm. - (PGI-87/WS/21)

I Unesco. General Information Programme and UNISIST
II IFLA International Office for UAP

© Unesco, 1987

PREFACE

For many years the General Information Programme of Unesco has produced guidelines and studies to help Member States develop national information systems, including libraries, information services and archives. The present document, which is part of this programme, aims at providing a manual on document supply measurement techniques which can be applied to a wide range of countries. It has been prepared by Maurice B. Line under contract with the International Federation of Library Associations and Institutions (IFLA).

The manual builds on existing performance measurement techniques relating these to different contexts within which document supply systems operate. Two levels of measurement are suggested, a basic level, and a rather more elaborate one, and the details of data to be collected, method of collection, frequency, etc. are given under each. Survey forms are suggested for level 1 and the main measures of level 2.

We hope that this manual will prove useful in collecting and keeping records on document supply activities and easy to use and to maintain.

The designations employed and the presentation of the material throughout this document do not imply the expression of any opinion whatsoever on the part of Unesco.

Readers are invited to send comments, suggestions for improvement, reports on experience gained using the manual or requests for additional copies to the Division of the General Information Programme, Unesco, 7, Place de Fontenoy, 75700 PARIS, France.

CONTENTS

		Page
	Summary	v
1.	Introduction	
1.1	Preliminary comments	1
1.2	The literature of performance measurement for document supply	2
1.3	Objectives of performance measurement	2
1.4	The nature of performance measurement	5
1.5	Problems of comparison	6
1.6	Practicality of measurement	7
1.7	Limitations of performance measures	7
1.8	Factors affecting demand for document supply	8
1.9	Factors affecting document supply performance	12
1.10	Terms used in the report	12
2.	Fill Rate	
2.1	The importance of fill rate as a measure	14
2.2	Problems with the use of fill rate as a performance measure	15
2.3	Desirable analyses of fill rate	17
2.4	Failures and reasons for them	20
2.5	Location of items	21
2.6	National provision	26
2.7	Practical calculation of fill rates and location performance	27

page

3. Speed

3.1 The importance of speed as a measure 30

3.2 Processes involved in document requesting and supply 31

3.3 Factors in the calculation and interpretation of speed 35

3.4 The practical calculation of speed 37

3.5 Timeliness of supply 40

4. User Satisfaction

4.1 The importance of measuring user satisfaction 42

4.2 Measures of potential demand 44

4.3 Practicality of measurement 47

4.4 User satisfaction with speed of supply 47

4.5 User satisfaction with other factors 49

5. Other Factors

5.1 Volume of demand 51

5.2 Range of resources available 53

5.3 Ability to accept blind requests and to extend resources 54

5.4 Robustness and flexibility 55

5.5 Ease of use 58

5.6 Quality 59

5.7 Minimal damage and loss 59

5.8 Balance and fair distribution 61

5.9 Ability to serve different sectors 62

5.10 Ease of monitoring 63

page

6. Costs

6.1 The relevance of costs to performance 64

6.2 The application of costs 65

6.3 Different types of costs 67

6.4 The calculation of costs 69

7. Proposals for Practical Performance Measurement

7.1 Introduction 74

7.2 Combined measures 74

7.3 Requirements of a performance measure system 76

7.4 Level 1 : basic measures 78

7.5 Level 2 : desirable measures 81

7.6 Sample survey forms 85

7.7 The use of automated systems to produce performance data 90

7.8 Responsibility for data collection, coordination and analysis 91

References 93

SUMMARY

This study aims to provide a manual on document supply measures which can be applied to a wide range of countries.

Chapter 1 considers the objectives and nature of performance measures as well as their limitations and factors affecting demand for document supply. Performance measures are of potential use to planners, users and suppliers. Since there is no objective standard of performance most measures need to be relative, and standardization of measurement is therefore important. Performance measurement yields valuable background information but does not usually provide sufficient for action to be taken. Additional information on causes of low satisfaction or delays is also needed.

In chapters 2-6 various measures are discussed, and the practicality of their use.

Chapter 2 is devoted to 'fill rate', that is the proportion of document requests that are met. This is a basic measure but has several limitations, including the fact that many users' needs are not translated into requests. Fill rates vary according to subject and format, and accordingly they have to be analysed by such factors as form of material in order to yield useful and comparable data. In

addition, supplementary inquiries may be needed. The ability to locate items is also discussed, and means of evaluating location systems such as union catalogues. A "hierarchy of performance" is suggested.

Chapter 3 deals with speed, of requesting, processing and supply. The various operations involved in document requesting and supply are listed, and five time stages identified. Desirable time measures are then considered; separate measures for the main time stages are needed if causes of delays are to be identified and remedied. 'Timeliness' (ensuring that documents reach users precisely when they are required) is briefly considered, though it is not a major factor with most requests.

Chapter 4 considers 'user satisfaction'. The satisfaction of users' needs is distinguished from the fulfilment of requests (= fill rate). A significant indication of the performance of a system is potential demand, which can be assessed either by surveys of users or much less directly by studying the volume of demand attracted by a system (the volume per head of population being the best comparative measure).

User satisfaction with speed of supply and other factors such as quality of service is more briefly discussed

Chapter 5 lists a number of less significant measures: volume of demand (particularly changes in it), range of resources available (and their relevance to needs), ability to accept blind requests (resources to be extended according to need), robustness and flexibility (ability to expand and adapt to crises), ease of use (affected by the simplicity of procedures), quality, minimal loss and damage, balance and fair distribution of supply, capacity to serve different sectors, and ease of monitoring.

Chapter 6 considers costs. Though they are not strictly a measure of performance, they are essential to the measurement of efficiency. They need to be defined and used carefully if they are to be of value; for example, a distinction needs to be made between direct and total costs, and visible and hidden costs. Unit costs should be used as a main measure. While some costs (photocopying, forms, etc) are relatively easy to calculate, staff costs are much more difficult. It is stressed that the purpose of a costing exercise has to be clearly defined before it is undertaken.

The final chapter offers proposals for practical measurement. Measures such as fill rate and speed should not be used in isolation, because there are often balances and trade-offs; data collected from the same survey can generally be used for various analyses. A performance measurement system must be simple and unambiguous. Two

levels of measurement are suggested, a basic level, and a rather more elaborate one, and the details of data to be collected, method of collection, frequency etc. are given under each. Survey forms are suggested for level 1 and the main measures of level 2. Although the use of automated systems in individual libraries can facilitate the routine gathering of data, it has to be supplemented by manual data. Although nearly all data must be collected in local libraries and supply sources, there should be in each country or system a central body with authority and responsibility for organizing and coordinating the collection of data and its analysis.

1. INTRODUCTION

1.1 PRELIMINARY COMMENTS

Document supply is an activity of increasing scale and importance. Whereas a decade or two ago it was generally assumed that traditional interlending between libraries, aided by union catalogues, would meet most needs, there has been a growing demand for improvement and an increasing realization that a more deliberate and planned approach was required if future needs were to be adequately met. A review of performance measurement is therefore timely.

Document supply systems can range from unplanned cooperation (not really a system at all) to carefully designed systems that involve acquisition schemes and possibly retention schemes. Effective supply of documents depends ultimately on their having been acquired and remaining available, and on their being accessible. This study, therefore, while concentrating on the supply of documents, also take into account the wider context in which supply takes place as well a access and requesting procedures. The study also includes commercial document suppliers, of which there are increasing numbers. (It should be noted that non-commercial libraries may act commercially when supplying documents: see chapter 6.1).

It is possible to measure performance in very sophisticated ways by using mathematical models or operational research. Examples of this

approach can be found in Arms (1979) and kouse (1976). This report does not attempt to deal with such approaches, interesting though they are, for sound practical reasons. They often involve subjective assumptions, they require a great deal of data to be usable in practice, and the techniques needed to use them are not within the capability of all but a few practising librarians.

1.2 THE LITEKATURE OF PERFORMANCE MEASUREMENT FOR DOCUMENT SUPPLY

There is much literature on performance measurement in libraries, but very little specifically concerned with document supply. Some of the few writings that deal with the matter are Lancaster (1977), Line (1983), Line et al. (1980), Turock (1985) and Waldhart (1985); some useful older references can be found in Rouse (1975). However, much literature on actual document delivery systems reports performance measures, much the commonest measures being fill rate and speed, followed by cost. Some examples are cited in this report, not necessarily as models of good practice.

1.3 OBJECTIVES OF PERFORMANCE MEASUREMENT

The measurement of performance has several objectives:

i. to assess how well a system (or country) is doing;

ii. to identify areas of weakness where improvement may be needed;

iii. to aid planners in deciding between possible alternative systems at a national or regional level;

iv. to assist a user (usually a library, possibly an individual) in deciding which of one or more alternative available systems it (or he) should use for all requests or for particular types of requests;

v. to enable a library to decide which method of requesting or supply to use;

vi. to enable a supplier to measure its effectiveness and efficiency.

There is no recognized objective standard by which to judge how well a system is doing, and most performance measures therefore need to be relative. Comparison should thus be possible between different systems, across countries or regions, and over time. To this end, measures need to be developed that are widely acceptable and that are used consistently. The more countries they are used in and the longer they are used the more they gain in value.

The identification of areas of weakness requires a certain amount of detail: it is not sufficient to know that a system is doing better or worse than it was five or ten years ago or than a system in a neighbouring country. Comparisons should be possible between (eg)

subjects or forms of material within a system as well as between systems.

It might be thought that the choice between alternative systems is one that few countries or regions have the opportunity to make from scratch. However, many less developed (and some developed) countries have either no document supply systems or ones that are so rudimentary that it is not only possible but highly desirable to design a system from the beginning; and even an existing system that is quite well developed may be capable of substantial modification and even radical redesign (as happened effectively in the UK between 1960 and 1973). The performance of systems in other countries or regions can provide valuable guidance in deciding what system to choose or whether to change the present system.

Many countries have more than one system, and certainly more than one source of supply (including sometimes commercial suppliers), that can be used by individual libraries, which need to select the one that best meets their requirements. They can of course each measure the performance of various systems or sources as experienced by them, but this would be a rather wasteful exercise, and nationally used and published measures would be more practical.

There are several alternative methods both of requesting items and of supplying them (the most obvious of the latter being loans and photocopies). It is useful to have measures for deciding which is the most appropriate in a given case.

All of these objectives can be met by performance measures that are standardized and used consistently between countries and over time, and that provide information that is capable of analysis in some detail.

1.4 THE NATURE OF PERFORMANCE MEASUREMENT

'Performance' in document supply is the success of a system in meeting demands and needs for documents. It is therefore vital to know both what demands there are for documents and also what needs there are; to know too how quickly they are wanted. It is then possible to judge performance against these requirements; for this purpose, the main performance measures are fill rate (the proportion of requests fulfilled), user satisfaction rate (the proportion of users' needs met), and speed. Each of these is dealt with in detail, and in the process subsidiary measures are discussed. It should be noted that all of these measures are ones that ultimately concern individual users rather than libraries (which are concerned only because it is their responsibility to satisfy users).

However, these performance measures, while of major importance, are incomplete without costs (though costs are not strictly a measure of performance - see chapter 6.1). Ultimately what any system should achieve is maximum cost-effectiveness. Costs will normally concern libraries rather than individual users, unless libraries pass on to them some or all of the costs they incur.

The main generally accepted measures are fill rate, speed and cost. They are also the most commonly used measures, although costs are calculated much less frequently than fill rate or speed.

1.5 PROBLEMS OF COMPARISON

Since most measures are of necessity relative, and thus depend on comparison (with other countries or regions or systems or periods of time), it is important that comparisons are valid. It is, for example, interesting that country A has a higher fill rate than country B; but the types of requests may differ quite widely, so that like may not be being compared with like. For example, in the UK there is much more demand for serials than for monographs (54% and 33% respectively); since it is generally easier to supply serials than monographs, the overall fill rate will, other things being equal, be higher than in a country where demand for monographs is higher than for serials. Within serials, scientific serials are easier to supply than humanities serials, and recent serials than older ones. Even within serials of the same subject and date, some are more esoteric than others, and in a country with more richly endowed local libraries demand tends to be for such titles, which are harder to supply than commoner serials. Indeed so varied is demand and so difficult does this variety make comparison that for a precise comparison performance for the same items would have to be measured. This could be done by taking a carefully selected sample of requests and feeding them into different systems as an experiment. In practice, a reasonable approximation can be achieved by

a detailed breakdown of requests and a comparison of carefully matched subsets.

1.6 PRACTICALITY OF MEASUREMENT

It is not too difficult to design measures which would if applied provide an excellent assessment of performance both in general and in particular aspects. The problem is however that such ideal measures are very unlikely to be used or indeed usable because of practical difficulties. Document supply systems vary greatly between countries not only in type but in the stage of their development and their sophistication. For each measure discussed in this report, the practicality of application is considered, as also, where appropriate, is the possibility of using imperfect or partial measures which can serve as indicators.

1.7 LIMITATIONS OF PERFORMANCE MEASURES

No performance measures, whether used in isolation or together, can give a complete picture, if only because it is never possible to apply them comprehensively and exactly. As noted above, most measures are relative, since there can be no absolute objective standard. Comparative measures often provoke as many questions as they provide indicators; for example, if one country's performance is worse than another's, and the comparison is valid, it then needs to be asked why

performance is worse before deciding whether to take action and what action to take. There are also policy issues: for example, an area of weakness may not be judged an area of importance in national terms (a high failure rate for oriental literature may be thought to be in less need of remedial action than a rather lower but still significant failure rate for agricultural serials).

Moreover, performance measures will often yield only part of the information needed for effective decision and action. For example, if speed of supply is in question, the present speed should first be ascertained, then the stage or stages at which delays occur, and then, critically, the causes of delays. Performance measures will provide the first step and if necessary the second, but not the third.

Measurement should be used as an aid to decision and action, never as a substitute for it. It is sometimes tempting to delay decision until rather more adequate measurement of performance can be achieved, even though sufficient measures are available to identify major weaknesses that need to be remedied, and though information is available on the performance of other systems that suggests means of improvement. It is never possible to work on the basis of perfect information, and the question that policy and decision makers need to ask is at what point adequate information is available.

1.8 FACTORS AFFECTING DEMAND FOR DOCUMENT SUPPLY

Below are listed some of the factors that influence demand for document supply from sources other than a user's library.

a. Independent of document supply system t

- Volume of literature produced (total amount, and volume of research literature).
  In general, the greater the volume produced, the less self-sufficient local libraries are and the more remote demand there is likely to be. The annual world output of research literature appears still to be rising.

- Cost of literature produced.
  The greater the cost, the less likely libraries are to maintain local adequacy.

- Adequacy of local library collections and acquisitions funding.
  Deficient funding can lead to more need that cannot be satisfie locally.

- Adequacy of local library funding other than for acquisitions. d
  Deficient funding can lead libraries to place restrictions on the number of requests users can make, even though deficient acquisitions funding can lead to more unsatisfied need.

- Adequacy of local library staffing.

Since document requesting requires staff time, inadequate staffing also can lead to 'rationing' of requests.

- Number of potential users (individuals).
  This depends not only on the size of the literate population, but on various other factors, such as prosperity of the industrial sector and the funds it devotes to research and development, and research funding of academics. In some countries, the number of persons conducting research has dropped substantially in recent years.

- Time available for research and pressures to do research.
  In spite of reduced research funds and fewer researchers, researchers may be under increased pressure to do research; in some industrial and academic environments, special time may be allowed for research.

- Bibliographic coverage of published literature.
  Literature that is poorly controlled bibliographically is less likely to be requested, and requests are much harder to verify. Coverage of some countries and of some kinds of publication is far better than of others. 'Grey' literature and on-demand publications are less amenable to control.

- Bibliographic visibility.
  This is the extent to which references are made known to users, not only by such means as current awareness and online access to

bibliographic databases but by the collections available. Most references are picked up from other literature, not from specific services; a poor collection will generate fewer references, and therefore probably fewer document requests.

b. Dependent to some extent on document supply

- Expectation of success (on part of requesting library and of user)
- Expectation of supply within required time
- Ability to locate wanted items
- Ease of use of system
- Cost (to library or to users).

It will be seen that many of the most important factors are independen of the document delivery system. Some are predictable within limits t and up to a few years ahead, but others are subject to substantial and possibly sudden variations, and in combination can have a large effect For example, a surge in literature production and prices combined with. a reduction in library funds is likely to produce dramatic results, bu these can be in the direction either of greater or of smaller demand, t depending on whether libraries respond by rationing demand. The factors above can influence not only the volume but the nature of demand; for example, a switch in research funding or in university courses towards the life sciences is likely to be reflected in documen demand. The volume and nature of demand are likely in turn to affect t the performance of the system.

1.9 FACTORS AFFECTING DOCUMENT SUPPLY PERFORMANCE

Several factors affect, more or less fundamentally, document supply performance. The two most basic are:

- General design of systems (whether centralized or decentralized, etc)
- Stock available for supply not only in volume but in nature; a large national stock of unwanted literature would not be useful.

To these must be added:

Efficiency: of requesting libraries
of supply sources
of procedures (forms, charging methods etc)

Staffing: of requesting libraries
of supply sources.

Factors external to supply sources or requesting libraries, such as the mail and telephone system, also affect performance.

1.10 TERMS USED IN THE REPORT

'Supply source' is used for the library or other source approached by a requester, whether or not it actually supplies the item in question. 'Requesting library' is used for any body (corporate or individual) that requests an item, partly because nearly all requests do emanate from libraries, partly for want of any appropriate more precise term.

A 'system' as used here does not necessarily imply a purpose-designed system; it includes also any arrangements, informal or formal, organized or unorganized, for document supply.

'Form' of material is used to describe the type of publication, eg monograph, serial etc.

'Monograph' and 'serial' are used in preference to 'book' and 'journal' or 'periodical', since not all continuing publications such as annuals are generally regarded as journals, while a book is a physical object and thus strictly includes a journal volume.

2. FILL RATE

2.1 THE IMPORTANCE OF FILL RATE AS A MEASURE

As noted in the previous chapter, the 'fill rate' - the proportion of requests that are met - is one of the three most generally accepted and used measures of document supply performance. Examples of its use are common. The term 'fill rate' is used in preference to 'satisfaction rate' and 'success rate' since it is better to reserve 'satisfaction' for the satisfaction of needs of individual users; 'success' is similarly ambiguous. User satisfaction is dealt with in chapter 4. 'Fill rate' is a more precise and objective term, which carries no overtones or ambiguities.

The fill rate is an essential but rather crude indicator of performance; a high figure suggests that the system is working well and a low one suggests that there are deficiencies. An overall fill rate, which is most commonly used, is much less useful than one broken down by form (monographs, serials, etc), subject, or date, since only by detailed analyses can one discover how well (eg) pre-1900 monographs are supplied compared with those published after 1900, how well agriculture is served compared with medicine, or how the supply

of serials compares with that of monographs. Without such information remedial action becomes almost impossible.

This chaper also discusses the performance of location systems, in particular union catalogues.

2.2 PROBLEMS WITH THE USE OF FILL RATE AS A PERFORMANCE MEASURE

There are several problems with the use of fill rates as an indicator; they by no means invalidate it, but they do need to be taken into account when using it.

a. Not all users' needs (= potential demand) are translated into use demands, nor are all user demands necessarily translated by the library into actual requests; the first point is dealt with more fully in chapter 4. A good system may attract a high volume of demand and so paradoxically achieve a lower fill rate than a poor system which is used only when the probability of success is verys high. This point is important when systems in different countrie are compared, or when the same system is studied at two points in time. In the latter case, the remedying of defects as a result of the first study can produce a better performance which may not show up in the second study because confidence in the system has increased. Such a comparative study needs to be accompanied by a full statement of developments in the system between the two studies. It is much harder to make such allowances when comparing systems in different countries, but an effort should be made to do

so. Ideally the proportion of users' needs that are translated into requests should be given, but this is never fully known and very hard to estimate. Also, samples of actual requests can be examined and assessed for relative difficulty, though this is inevitably a rather subjective procedure.

b. A related problem is the ability to locate wanted items (see 2.5 below). A system that offers little in the way of location devices (union lists) can make it difficult for a library to translate user demands into actual requests directed to a source of supply. Paradoxically, an excellent location system can deter libraries from making requests for any item not so located, whereas a less adequate location system may encourage some 'blind' requesting. A dedicated supply source which builds up its collections in response to demand will wish to receive blind requests. Indeed, the ability of a system to handle blind requests, while not perhaps a performance indicator, is certainly a desirable feature (see chapter 5.3). The fill rate of a system that accepts requests only for located items cannot be fairly compared with one that accepts blind requests.

c. In a country with well-endowed local libraries, demand on the document supply system will include a larger proportion of more 'difficult' and obscure material, which will be harder to supply. There will thus, other things being equal, be a lower fill rate than in a country with less adequate local libraries; or alternatively, a similar fill rate will indicate a better

performance (because the 'difficult' requests may be capable of being met from other well-endowed libraries).

d. Different fill rates can be expected for different subjects, form and dates of material: for example, recent scientific serials are much easier to supply than historical monographs published in, say, 1910. The composition of demand may differ a good deal betweeen countries (as indeed the ratio of monographs to serials does between US and the UK); a comparison of overall fill rates h in suc circumstances is bound to be flawed.

2.3 DESIRABLE ANALYSES OF FILL RATE

For the reasons given above, overall fill rates are limited in their value. Some of the limitations can be removed by the use of more detailed analyses. Since one of the objects of performance measures is to identify areas of weakness and where possible remedy them, it is important to know, for example, how well historical serials are supplied compared with scientific serials, or pre-1951 with post-1950 monographs, or indeed the social sciences generally with the humanities and natural sciences.

It is possible to elaborate analyses almost indefinitely, and if requests are coded for computer handling analyses additional to the main ones can usually be done. The minimum coding suggested as required is:

form : monograph

serial

other printed (eg grey literature)

audiovisual

(NB the physical format of textual matter - printed or microform - is not considered relevant: any printed work can be published, or supplied, in hard copy or microform)

date : last 5 years

previous 10 years

then two 20-year intervals

then by century

(eg in 1990, the codings would be 1986-1990, 1976-1985, 1956-1975, 1936-1955, 1900-1935, 1800-1899, 1700-1799).

subject : humanities

social sciences

science and technology

miscellaneous (and unidentifiable).

Ideally these codings should be standard practice within and between countries, to facilitate the comparisons that are the most important elements in performance measurement. It should be noted that these codings are also important when speed and (to a lesser extent) costs are being measured.

It was suggested above that a truly valid comparison of fill rates requires a detailed scrutiny of actual requests. This is hardly likely to be practicable on any scale, but an occasional use of this method would be useful as a check on the more general measures. If it was found that it added little or nothing of value, it would still validate the broader measures.

This idea could be extended. Developed document supply systems could be tested by feeding into them a carefully selected sample of 'dummy' requests, of varying nature and degrees of 'difficulty', which would be treated as ordinary requests in all respects except that the items would not be supplied. (This would not be wise in the case of rudimentary systems because they may already be overburdened). This would provide an accurate comparative measure of fill rate, though the validity would depend to some extent on the number of requests as well as on the composition of the sample. At the very least, it would enable the true comparative performance of two or three developed systems to be assessed, avoiding the pitfalls mentioned above.

Some examples of fill rate studies across countries may be found in Parker (1982); across systems, in Taler and Klapper (1982); over time, in Vinzent (1978); by subject, in Kunz (1979) and van Trier (1980); and by form and date, in Sierla (1979). Palmer (1985) gives the British Library's fill rate for foreign requests (also by subject and form of material); while Clarke (1982) and Merry and Palmer (1984) report its overall fill rate (also by subject and type of user).

2.4 FAILURES AND REASONS FOR THEM

The value of measuring the fill rate is much enhanced, and one of the objectives of measurement brought nearer to attainment, if analyses ar carried out on failures. The types of material that are not supplied are in themselves of interest for national planning; but the reasons for failure are of greater interest. These reasons may include:

- item not identified (very obscure item, or inaccurate reference)
- item not held by supplying source (or in the system, or in the country)
- journal held but issue not received
- item held but in use in supply source at time of requesting
- item held but supply source unwilling to lend (reference work, valuable item, recently acquired, on student reading list etc)
- item held but too fragile to copy
- item missing.

Some libraries may prove more willing to supply items than others, and; for this reason it is often useful to measure the fill rates of different sources used.

Some causes of failure are more open to remedy than others. It may be possible to acquire items not held in the country or within the system requesters may be induced to provide more accurate requests; more generous loan or copying policies may be encouraged; and so on. Novak-Booth (1982) provides an example of a study analysing reasons for failure.

2.5 LOCATION OF ITEMS

To locate items in a system is of course by no means necessarily to ensure their supply; and in systems with very strong centralized collections supply may be achieved without prior location. Nevertheless, since most systems will accept requests only for items that can be located in the system, the ability to locate items in such systems is a condition of fulfilment and it is therefore considered in this chapter. This section discusses means of evaluating location systems. The most obvious and common form of location system is the union catalogue, a combined list or catalogue of the holdings of numerous libraries.

The most important element in a union catalogue is the selection of libraries that are included in it. A totally comprehensive catalogue, covering every library in a country, is difficult and expensive to construct and maintain, and particularly difficult to keep up to date - it is much harder to get 2,000 libraries to enter, amend and delete records quickly, and to check whether they are doing so or not, than 200 or 50 libraries. Large union catalogues can also be difficult and confusing to use. Even if costs are ignored, therefore, performance is not necessarily related to comprehensiveness. On the other hand, if only 50 out of a country's 1,000 libraries are included, some items that are wanted may not be located because they are in one of the 950 not included in the union catalogue.

In most countries with a significant number of libraries it will be found that a relatively small number of them hold the majority of the titles (not copies) of works in the country. In the hypothetical example above of a country with 1,000 libraries, 20 of them (mostly large academic libraries) may contain 50% of all the titles in the country, and 50 may contain 80%. 100 may be needed to reach 90%, while 100% may not be attained until 500 or 600 are included, if then. (A powerful National Library, with full legal deposit of national imprints in two copies, one of which is available for loan, and a wide range of foreign works, may well have over 50% of titles itself). The law of diminishing returns operates, and beyond a certain number of libraries the inclusion of new ones adds very little to the total number of titles but does add to the costs of the system: in fact, the marginal cost begins to exceed the marginal benefit. Arms (1973) has shown how this can be modelled. (As noted in chapter 6, costs are not strictly a measure of performance, but they are highly relevant to efficiency).

It should be borne in mind that the total number of titles in the country is less important than the number of titles that are likely to be wanted and the volume of likely demand for each; it would be wasteful to include many titles (eg of children's books) that were unlikely to be wanted by remote users, but also it would be wise to have several locations for works (especially serials) likely to be in much in demand.

Costs of including holdings have come down with the development of automated union catalogues into which records can be put direct, but access to the holdings in other countries has also become easier, so that the disadvantage of not locating an item that is held in the country of the requesting library is less.

Similar arguments apply to the types of material included. If there is a very strong central collection of scientific serials, for example, there may be no point in including such serials in a union list; an alternative would be to include only those serials that were not in the central collection. The aim in all cases would be to maximize the ability to locate items with minimal cost and difficulty - in other words, to optimize access.

It is particularly hard to set down measures against which the ability to locate items (whether by union catalogues or by other means) can be judged. The percentage of wanted items that are located can of course be calculated, and to do so is useful; but it would be equally useful to know the percentage of these wanted items that is in the system, whether located or not, so that the performance of the location system can be measured in terms of the proportion of wanted items held that is represented by items located. It is particularly desirable to measure this, not only because it tests the coverage of national holdings but because it helps to test also the up-to-dateness of the location system - an important point, since many requests tend to be for very recent publications, which may take time to get into union catalogues. An estimate could be made by checking a sample of

requests against the holdings of a large number of major libraries, though this would be an underestimate.*

Even if a valid measure of this kind could be made, it would reveal only the performance of the system, not its efficiency. Efficiency should certainly be taken into account when any union list is planned or constructed, but there is no simple measure. The best that can be done is to put libraries in an estimated rank order of holdings of unique items and then calculate the additional holdings to which each additional library provides access. This can be done somewhat crudely by taking a sample of recent acquisitions and finding out what proportion are already locatable. At the same time the additional costs and problems caused by including each additional library should be roughly calculated.

As with the calculation of fill rates, location systems should ideally be measured according to categories of material: overall location rates are of little value.

The accessibility of the location system also needs to be considered. An online system may be out of reach for libraries with no computers or with no link to the database. A published union list may be too costly for some libraries to acquire. A microform union list requires a reader - and so on.

Location is only the first step: the wanted item may be in use or otherwise inaccessible. The ability of a system to inform requesting

libraries when a located item is unavailable (eg because it is in use elsewhere, or not yet available for loan) is a desirable additional feature, though its advantages are less in a system that permits rapid switching of requests to alternative locations. This is dealt with in chapter 3, since it affects the speed of the system, whether of supply in the case of requests that can be sent to other supply sources, or of a negative response in the case of unique locations.

The Arms article cited (1973) is one of the very few writings that even touch upon union catalogue evaluation. Turock (1985) deals with it somewhat indirectly. Success in finding locations is reported in several articles, including Freeman (1978).

---

* It may be clearer if this is expressed in algebraic terms. Let R be the number of requested items, RL the number of requested items located, and RS the number of requested items in the system. RL/R measures the proportion of wanted items located; RL/RS measures the performance of the location system in terms of its ability to locate wanted items that are held in the system. For example, of 100 requested items, 90 might be held in libraries in the system, but the location system might provide access to only 80. In this case, RL/R would be 80%, and RL/RS would be 89%. A comprehensive location system in which RL = RS would have located 90% of requested items.

2.6 NATIONAL PROVISION

A document supply system and its fill rate depend ultimately on what has been acquired, and only secondarily on the ability to locate items that have been acquired. The ability to anticipate demand is therefore one of the most important features of a good document supply system. Without this the system is at the mercy of what happens to have been acquired. Even if there is a national or sub-national acquisition system, this is useful for document supply only insofar as it is geared to ensuring that items likely to be wanted for remote supply are acquired - some national acquisition systems aim to achieve a balanced collection of a wide range of materials, and likely demand is a less important criterion than intrinsic significance (so that, for example, a Western European country might have an excellent collection of materials in Oriental languages coexisting with underprovision of Western scientific materials).

The best measure of provision is the proportion of wanted items (wanted rather than merely requested: see chapter 4) that are present in the country or system. This of course requires some means of finding out what is wanted rather than requested, though the percentage of requested items that are present may give a crude optimistic measure of performance, unless, as is common, only located items can be requested (in which case the performance will be greatly inflated).

2.7 PRACTICAL CALCULATION OF FILL RATES AND LOCATION PERFORMANCE

Ideally, a sort of hierarchy of performance would be used, as follows:

a. Number of items wanted (see chapter 4)

b. Number of items requested

c. Number of items located (when location systems are used)

d. Number of items supplied.

The following percentages would then be calculated:

(i) b as % of a

(ii) c as % of a

(iii) d as % of a

(iv) c as % of b

(v) d as % of b

(vi) d as % of c.

In practice, the data required for a, and hence for (i), (ii) and (iii), is hardly ever available, but (v) is fundamental, and (iv) and (vi) are certainly useful.

It is easy for a supply source that handles a large number of requests to measure its fill rate; how useful this is as a national indicator of performance depends on the proportion of total requests that it handles. Otherwise, or in addition, measurement has to be done in several, or many, individual locations, either requesting libraries or supply sources or both. A selection of requests in each library should be adequate; this would consist either of all requests within a given period or periods, or a random sample over a longer period. Although the former requires more work to be done within the period, it is more manageable than the random sample, which requires the coordination of regular data collection by a considerable number of libraries over a long period.

The sample of libraries used to collect data needs to be carefully chosen. If a national survey is wanted rather than a survey of one sector (eg academic institutions), an estimate needs to be made, if the figure is not already known, of the proportion of demand coming from different sectors so that the sample can be stratified to provide similar proportions. Since overall speed can best be studied by requesting libraries (see chapter 3), the basic sample should be of requesting libraries rather than supply sources; the same survey can thus be used to produce data on both fill rate and speed.

Supply sources that handle a great deal of demand will probably wish in any case to collect regular information on their performance, whether by sample surveys (in which case these should be coordinated with requester surveys) or by total data collection; the latter is carried out by the British Library Document Supply Centre to provide total fill rates, but extra surveys are required to provide more detailed analyses.

Where it is desired to measure the performance of location systems, the percentage of wanted items that are located can be calculated by requesting libraries in systems which have automated union catalogues with direct on-line access or printed union catalogues which can be acquired by libraries. Similar considerations of sampling apply as in the case of the direct calculation of fill rates. When catalogues are not available or accessible in such ways, the job of locating is usually carried out by centres that maintain master catalogues, and only these centres can make the required calculation, if necessary on a sample basis.

Forms for data collection are considered later (chapter 7.6).

In all cases involving several or many libraries, there has to be a central focus responsible for the management of the data collection, for the gathering in of the data once collected, for its analysis and for producing reports on it.

3. SPEED

3.1 THE IMPORTANCE OF SPEED AS A MEASURE

Speed of supply (related to but distinct from timeliness: see below) is obviously a major desideratum. A slow service cannot satisfactorily supplement access to local holdings, and it certainly cannot serve as a substitute for local access. Conversely, a very fast service can for many documents be almost as satisfactory to a user as direct access to local holdings. A service that is slow lacks credibility and deters demand.

Various studies have been done of the need for speed (eg Houghton and Prosser (1974), Barr and Farmer (1977), Stuart (1977) and Stone (1983)). (It may incidentally be noted that nearly all studies have been done by requesting libraries, which have a much stronger interest in speed than supply sources). These have generally shown that most people can wait two or three weeks for most requests, though they prefer a faster service, but that for some requests supply within two or three days, or even the same day, can be vital. Survey results are inevitably influenced by the experience and expectations of users; people who have become accustomed to a seven-day turnround time are less likely to say that two or three weeks would be satisfactory than people who are used to a much longer supply time. However, if a standard had to be stated it would have to be a 'normal' maximum turnround of three weeks, with an extended period for exceptional

difficult items, with provision for fast supply when needed of two or three days, and preferably with provision in exceptional circumstances for same-day supply. (User satisfaction with speed of supply is discussed also in chapter 4.4).

Speed is important not only as a comparative measure of performance but because its measurement can identify weaknesses, in particular the precise points where delays are occurring, and lead to steps towards improvement, whether by changing the system so that some procedures are eliminated or simplified (eg multiple consecutive requesting) or by making the operation of procedures more efficient.

3.2 PROCESSES INVOLVED IN REQUESTING AND SUPPLY

Since the purpose of measuring speed is to see where improvement can be made, it needs to be broken down into the times taken by the various processes and elements involved in supply. It might be thought that strictly only the processing time in the supply source was a performance measure of a document supply system. The handling of requests from users by the requesting library, and the handling of items once received, are the responsibility of the requesting library. However, the choice of a supply source, and indeed the ability to choose one at all, are to some extent features of the system. Likewise, the postal system in a country may be beyond the control of either requesting libraries or supply sources, but there may be other alternatives that are within the power of the system to influence or

even develop specially, such as special courier schemes and electronic networks; and even when there is no power to influence there is often an ability to choose. For these reasons, all the processes involved in document requesting and supply are included here, although it is accepted that the turnround time in the supply source (supply processing time) is the most central element and the one most under the control of the system.

a. Request processing time. The interval between the user submitting the request and the local library transmitting it. Any or all of the following processes may be involved:

- transmission of request from user to local library
- verification of request
- checking against local catalogue
- checking union list(s)
- exploring possible sources not recorded in union list(s)
- ascertaining protocol for requesting
- filling in form (or keying in request)
- recording request for local file.

Delays can occur through inadequate staff resources, pressure of time at peak periods, or simple inefficiency (whether in the procedures used or in the way they are used).

b. Request transmission time. The interval between the local library transmitting the request and the supply source receiving it. This is beyond the control of the local library except insofar as there

may be a choice of carrier. Telex, electronic mail or direct computer transmission are virtually instantaneous, though if requests are sent to countries in different time zones they may not be received in working hours and so may lose effectively more than half a day in transmission.

c. Supply processing time. The interval between receipt of a request by the first library to which it is sent and despatch of the wanted item, not necessarily by the same library. This is the sum of

(i) processing time in each library - time between treceipt of request and transmission either of item or of request to another library

(ii) transmission times of requests between libraries in cases where requests are forwarded.

c (i) is a performance measure in its own right. It can be broken down into several elements:

(a) time between physical receipt of a request and the handling of it. There may be delays in the transmission of mail from the arrival point in an institution or supply source and its receipt by those responsible for document supply; or mail may lie unopened for a time, or it may not be dealt with immediately after opening, or requests sent by Telex or computer may not be collected at frequent intervals.

(b) time spent searching the catalogue

(c) time involved in actual retrieval of the item from the shelves or other stores (eg microfilm cabinet, optical disc store)

(d) time spent photocopying, microfilming or digitizing in cases where the original is not lent

(e) time spent packing the item

(f) time between packing the item and its despatch.

In cases where a supply source is not able to supply an item, d-f and possibly c are not incurred, but in their place other steps have to be taken before the request is returned or sent on to another supply source.

Where documents are transmitted by telefacsimile or on-line from a digitized store, e and f are replaced by the processes involved in transmission (establishing a connection and actually transmitting the data).

In the case of on-line access, the supply source may spend no time at all since the requesting library or user may log on and retrieve the required item with no intervention at the supply end.

As in the case of the request processing time, delays can result from inadequate staff resources, time pressure or simple inefficiency.

d. Supply transmission time. The interval between despatch of a wanted item and its receipt by the requesting library. Methods of transmission include mail, courier, telefacsimile and on-line from digitized text.

e. Supply handling time. The interval between receipt of a wanted item by a library and its receipt by the user. This can be divided into:

(i) time between receipt of item by library and notification of user. This time will include checking of records and recording of receipt;

(ii) time between notification of user of item's arrival and its receipt by him or between despatch of actual item (eg photocopy) to user and its receipt by him; the latter is obviously quicker as only one step is involved.

3.3 FACTORS IN THE CALCULATION AND INTERPRETATION OF SPEED

a. Only one of the processes described above (c) is in the hands of the supply source, and that not fully, though the supplier can influence process b, eg by accepting requests by telex or

computer, and also process d, by using a rapid transmission method. It should be noted that telefacsimile may involve extra work by the supply source. The system has much to do with c, and little to do with the rest, eg if it puts impossible demands on inadequate libraries it invites delay in processes a and e, and if it sponsors a transport scheme it can affect processes b and d.

b. Average speed, especially mean average, can be misleading; a system with a 'normal' speed of 2 weeks but an ability to respond in 24 hours when necessary may be better than one with a 5-day average that can never supply in less than 3 days. Ability to respond very quickly when required is therefore a requirement, and speed of supply for urgent requests (wanted within, say, 1, 3 and 5 days) is therefore an additional measure. Median speed is a better average to use than mean, which can be distorted by a few extreme values. A system that delivers 90% within 14 days and the remaining 10% within 50 is better than one that delivers only 10% within 14 days and 90% within 20.

c. (A rather similar point). Reliability and consistency may also be important. If there is an assurance that most requests will be satisfied by a system within 14 days, this is better than a system with very wide and unpredictable variations in speed. For this reason, and also to provide information for b

above, the total distribution of elapsed times should be calculated where possible, as well as a simple median or mean.

3.4 THE PRACTICAL CALCULATION OF SPEED

Ideally, to obtain a full picture of the performance of a system the time involved in all the processes and sub-processes listed above should be calculated. This is particularly important if it is wished to improve the speed of a system, since improvement is impossible unless it is known precisely where delays are occurring. Detailed analyses may produce some surprises. For example, request and supply transmission time may be expected to account for a high proportion of the total elapsed time, but delays at the requesting and supply ends probably play at least as large a part - and they are generally more amenable to improvement. In practice, detailed measurement of this kind, while possible and desirable on an occasional basis, is too time-consuming to be used on a large scale as a matter of routine. Even on an occasional basis, the participation of both requesting libraries and supply sources is needed to provide a full picture.

The total elapsed time - the simplest and crudest measure of speed - can be supplied only by requesting libraries.

The time spent on the separate elements in the requesting and supply process can be provided by noting the date (and if necessary time) at various points in the process:

i. submission of request by user

ii. dispatch of request by library

iii. receipt of request by supply source

iv. dispatch of item by supply source

v. receipt of item by requesting library

vi. receipt of item by user.

The intervals between these points provide the times a-e in 3.2. i, ii, v and vi can be provided only by requesting libraries, iii only by sources; iv can usually be identified by the postmark in the case of items sent by mail, otherwise it has to be specially recorded by the supply source.

Responsibility for recording times therefore lies as follows:

a. Request processing time. Requesting libraries

b. Request transmission time. Source libraries (from postmark or other indication of despatch date or time)

c. Supply processing time. Supply sources

d. Supply transmission time. Requesting libraries (from postmark or other indication of despatch date or time)

e. Supply handling time. Requesting libraries.

It would be unreasonable to require libraries to collect data on supply times for all requests, even if only the total elapsed time is wanted. Any collection of data on speed must therefore be done

on a sampling basis, using samples both of requesting libraries and supply sources and of requests and supplies. Where a high proportion of demand is handled by one or two sources, they must always be involved in data collection on their performance; otherwise, random samples of libraries can be used. As for requests, since it requires a certain amount of special effort to set up a survey it is best to carry out studies at two or three different times of year (to allow for variations due to different volumes of demand and pressures of work, etc).

At the least, the time involved in each of the five elements should be calculated, though if information on the system is wanted, rather than on the processes, a and e can be omitted, as they have little to do with the system and are almost entirely within the requesting libraries' control. If a basic survey of this kind is done once every three years, say, a minimal picture will be obtained. As stated above, such surveys should be supplemented by occasional detailed surveys in a smaller number of requesting libraries and supply sources.

The units of measurement should be in days, though with urgent requests they should be in hours. Allowance should be made for non-working days: in most Western countries, despatch on Friday and receipt on Monday is equivalent to one-day transmission. As well as calculating median or mean times, it is useful to analyse the data so as to show the proportion of requests supplied within: same

day (for urgent requests), three days, six days, ten days, and then multiples of ten. (A distribution curve will give the clearest picture). Where multiple consecutive requesting is involved, the cumulative proportion of requests satisfied by each supply source in turn is worth calculating, since this is a large potential cause of delay (eg 60% satisfied by first supply source, 75% by first two, 80% by three etc).

Examples of studies of speed of supply are quite numerous. They include: Novak (1982) (processing times in a single supply source); Budd (1986) (turnround times broken down into three stages); Taler and Klapper (1982) (comparison across time); White (1986) (broken down by type of material and channel used); Parker (1982) and Sanner (1983) (comparison between different countries, and between national and international supply); Baker (1982) (comparison of different methods); and Turock (1985) (comparison of different sources and systems). Clarke (1980) and Pilling (1987) report the number of days both requests and items (loans or photocopies) spend in the mail, respectively within the UK and between the UK and other countries.

3.5 TIMELINESS OF SUPPLY

Timeliness is the ability of a system to supply items precisely when they are wanted. It is included in this chapter because it is related to urgency, but it should be distinguished because some items may be wanted at a specific time but not immediately. For

example, a student class may need access to a certain book for a particular essay. If the essay is to be done in a week, the article is needed urgently; but it may not be wanted for 6 or 7 weeks. It is useless if the book in question is received in 2 weeks and has to be returned in 5 weeks. This consideration applies particularly to audiovisual materials, such as a film that may be wanted for a showing on one specific date. Precise timing can be very difficult to achieve, both for the supplier and because of the possible vagaries of the transmission method used. Normally a good approximation to the time required, with early arrival and a generous loan period, is the best that can be provided; for example, it may be arranged for an item to be despatched 10 days prior to the precise date on which it is wanted, with a loan period of 2 weeks.

Timeliness can be measured only for the particular cases where it is a requirement. It is not a major or significant measure because it affects few requests, but for those few it may be important.

4. USER SATISFACTION

4.1 THE IMPORTANCE OF MEASURING USER SATISFACTION

It was pointed out in chapter 2.2 that fill rate, the most commonly used measure of performance, measures only the proportion of actual requests that are met. It does not measure the extent to which users' needs are met. Users' needs can be frustrated at three stages:

a. users may not articulate their needs into requests because their expectation of success is very low or even nil, because they are not permitted to make requests, or because the quality of bibliographic access available to them is poor

b. users may turn their needs into requests, but the requests may then be rejected by their library as inappropriate, unacceptable (eg because they go beyond a prescribed limit of requests), or unsatisfiable in the library's view (ie the library's expectation of success is very low or nil)

c. requests may be submitted but not be satisfied.

c is the request failure rate, which is easily derived from the fill rate, but a and b can equally contribute to non-satisfaction of needs. A poor performance at stage c will of course affect stage b, which in turn will affect stage a.

As noted in chapter 2.2, fill rate is an incomplete measure because a poor system which attracts little demand, all of which tends to be 'easy', can achieve a higher fill rate than a good system which attracts heavy demand, including some for 'difficult' items. Also, in most systems only those items that are located can be requested, so that the fill rate cannot serve as a measure of the capacity of the resources available to meet needs.

What is therefore needed is some measure of potential demand; the proportion that actual demand constitutes of potential demand can then be calculated. A low percentage would indicate a weak system, while a high percentage would suggest a good system.

There is in fact a still deeper level of need. Users come across references that they wish to see, but they cannot assess their value until they actually see them. It is probable that a significant proportion of items obtained from remote sources prove on inspection to contain no useful information, and in that sense represent a waste of money and effort. No document supply systems are able to avoid this, although prior selection can be aided in the case of many serial articles by the consultation of abstracts, in printed form or on-line, from such databases as BIOSIS. For this reason, the ability to enable identification in advance of the usefulness of material is not discussed here as a performance measure, though it should be mentioned that Stone (1983) makes an admirable attempt to deal with it. If full text of more articles and possibly other literature becomes available on-line, and libraries have ready access to it, the problem is solved

insofar as remote supply is concerned, although unnecessary costs will still be incurred through on-line searching which proves fruitless.

The ultimate measure of performance of a document supply system is the contribution it makes to an individual's personal development, and possibly to the economic and other benefit to his or her institution, industry or country. This also is not considered here, partly because it is remarkably intractable to measurement but mainly because it applies to all literature provision, whether by purchase or through libraries, not only to remote document supply.

4.2 MEASURES OF POTENTIAL DEMAND

It is clearly not easy to measure potential demand, since some of it is not translated into actual demand. There are two main ways of assessing it: direct and indirect.

a. Direct measurement of potential demand

Potential demand can be studied directly by surveying users, who can be asked either general or specific questions.

(i) General questions would aim to discover how far users felt they were able to translate their needs into requests, and what proportion of needs they had actually so translated.

This method was used in a Unesco-funded study in two less-developed countries (Vickers (1983)). This is a highly subjective and unreliable assessment, but it is better than nothing, and is tolerable as a comparative measure if it can be reasonably assumed that users of two different systems or in two different countries make similarly crude guesses. At the very least, such questions can provide useful information on users' views of the system, though these too will be affected by expectations (a good system which arouses high expectations may be criticized quite strongly when it does not always live up to them).

(ii) Specific questions would try to ascertain over a period of time (at least a week, preferably longer) all items that a sample of users wished to see; they would be asked to note down the references as they come across them, and what they did about them (found them in local library, applied for remote supply - whether the application was accepted or rejected by the local library, did not pursue, etc). This method is demanding on users, who may not therefore cooperate fully. There will also be an element of subjectivity, and the behaviour of users may be affected by the survey (eg they may note down references in which they do not have a strong interest, they may make document requests for items they would not normally request, etc). The users who agree to cooperate may not be a random sample. It is not possible to survey large numbers, and the subsequent checking of references and analysis

can be time consuming. Nevertheless, such surveys from time to time can be highly illuminating, and can certainly add perspective to fill rates. (For an example of its use, see Line (1973)).

b. Indirect measurement of potential demand

One indirect measure of potential demand is the volume of demand attracted by a system. There can of course be no absolute standard for volume of demand, only relative standards. If, for example, two countries of similar sizes, levels of development and standards of local library provision have widely different volumes of demand, it can reasonably be assumed that the one with the higher volume is tapping a much larger proportion of potential demand. It is particularly interesting to see if and how the volume of demand changes as the system develops and improves. Other things being equal, a growth in demand will indicate that a large amount of potential demand is being tapped, while a static demand will suggest that demand is near saturation level. In fact, of course, there may be several contaminating factors, such as declining or improving provision at the local library level, an increase or a decrease in the amount of research being carried out, etc. (see chapter 1.8); but a longitudinal study of this kind is at least suggestive.

Although total volume is a useful measure, it is better to calculate volume per head of population to make comparison easy between countries or regions of different population sizes. It is possible to go further

and allow for different education levels by calculating demand per educated user; figures for educated users will probably be given in official statistics as persons who have received secondary or higher education (both figures are useful).

4.3 PRACTICALITY OF MEASUREMENT

Since direct measures are very demanding of time and effort, and in particular require a good deal of user cooperation (especially specific questioning), they can be used only sparingly. They are best used in a few 'closed' communities such as universities or industries.

Indirect measures such as volume of demand are difficult to employ because although only a global figure is wanted there is no easy way of calculating it. Even when there is one dominant supply source, as in the UK, it will not be the only one, and special surveys are needed to calculate the total amount of document requesting and supply. In fact, there is no alternative at present to large scale surveys, whether these are total or use a random sample (stratified or not). In a totally computerized system, which all libraries used for requesting, calculation could in due course become very easy.

4.4 USER SATISFACTION WITH SPEED OF SUPPLY

The extent to which users' needs are met is only one aspect of user satisfaction. Users can of course also be satisfied or dissatisfied,

or inconvenienced more or less seriously, by speed of supply. Dissatisfaction and inconvenience are not the same: a user accustomed to a rapid supply may be dissatisfied with an occasional delay. Moreover, 'inconvenience' can range from the unfortunate but non-critical holding up of a piece of research to the failure to receive by a crucial time information that is urgent for commercial reasons or even reasons of life or death (eg medical information).

Several studies have been carried out, mainly in the UK, into the attitudes of users to delays or the effects of delays on them; see Houghton and Prosser (1974), Barr and Farmer (1977), Stuart (1977) an Stone (1983). None of these was able to distinguish inconvenience fro real urgency, but Stuart assessed users' own views of inconvenience byd asking what they would have been prepared to pay to have had the supplm time reduced for each item.

User satisfaction with speed of supply is not a good comparative measure between countries, since it is inevitably subjective and highl influenced by expectations of the service and also by the general climate of opinion (eg the importance attached to priority of researchy results). Nevertheless, it is a useful measure within a country, and occasional surveys can add depth to more routine studies of speed of supply. Surveys should aim to distinguish between dissatisfaction without inconvenience, inconvenience without serious consequences, and serious consequences of delay; these last, if any, should be specified

Surveys are most easily carried out in institutions such as universities and industries, but there is no reason other than possible small sample size why they should not be used in public libraries. A sample of at least 200 is desirable, preferably 500. To avoid freak circumstances such as might exist in one institution, several institutions should be surveyed; four or five could well be adequate, and ten would normally be ample.

4.5 USER SATISFACTION WITH OTHER FACTORS

Users are or may be concerned with other factors such as quality (eg of photocopy) and condition of borrowed books. Quality is discussed in chapter 5.6.

They are also interested in the service offered by their local library with regard to document supply. An efficient system can appear unsatisfactory to the user because his local library offers a poor service, eg in notifying users of the arrival of items, in using the most efficient sources, and so on.

These and other aspects, much less critical than the satisfaction of users' needs, can be studied if required by occasional surveys of user satisfaction, though the requesting library should be able to assess such factors as quality without consulting users, and users can be expected to complain of poor service if they are aware of where the

fault lies; indeed, complaints can be a quite adequate measure of some aspects of performance.

Much the fullest study of user satisfaction is that carried out by Stone (1983) at the University of Sheffield. It concentrates on supply times, usefulness and relevance, and does not attempt to assess potential demand, but it adds significantly to our knowledge of document supply from the users' angle. (See also Stone (1984)).

5. OTHER FACTORS

Apart from fill rate, speed, and user satisfaction, the main measure of performance is cost. This is dealt with in the next chapter. This chapter deals with other measures and factors of greater or lesser significance. Though they are all relevant factors, some of them are in practice difficult if not impossible to measure statistically, and a few are difficult even to assess subjectively. The order in which they appear here is not intended to indicate their relative importance.

5.1 VOLUME OF DEMAND

In chapter 4.2 volume of demand was proposed as an indirect measure of user satisfaction, or, ore precisely, the degree to which user needs were being expressed as demands. However, volume of demand is a performance measure in its own right.

In chapter 1 various factors affecting demand for document supply were listed, many of them independent of the document supply system. These all need to be taken into account when using volume of demand as an indicator of performance. Nevertheless, if used with care it is valuable as a comparative measure across countries or systems or in the same country or system over time.

A steep growth in demand may be due largely to extraneous factors, but it is unlikely to occur if the system is incapable of dealing with it.

particularly within a country if one system attracts more demand than another. A 'good performance' can mean an improved fill rate, faster speed of supply, greater ease of use or higher quality (see below), lower costs (see chapter 6), or other features: other measures of performance should indicate which.

Volume of demand is an especially useful measure for a particular document supply system. A fall in demand is a cause for concern, particularly where the system competes with other systems for demand and when the fall is not parallelled by other systems in the country. A centralized system will generally have large fixed costs; a fall in demand will therefore lead to an increase in total unit costs and may if sustained threaten the economic viability of the system.

Although volume of demand is a useful measure over time, changes in demand have to be analysed and interpreted carefully. The actual quality of performance of the system, in fill rate and speed of supply, is by no means the only factor affecting the volume of demand. Other reasons for rises or falls in demand include an increase or decline in local provision, an increase or reduction in library staff or other resources which may lead to restrictions, changes in national research priorities, or increases or reductions in research or higher education leading to larger or smaller numbers of users.

Volume of demand can be measured either at the requesting end or at the receiving end; the former is better because other measures can be used at the same time. Unlike other measures of performance, volume of

demand cannot be calculated accurately by sampling libraries, since even libraries of a similar type and size may differ widely in the number of requests they send or receive. It can be estimated by sampling certain days in the year, which should ideally be spread over the whole year; in practice this is difficult and expensive, and it is probably adequate to take a given continuous period of time, from a week to a month (the smaller the expected volume, the longer the period should be), which is believed to be fairly typical; it should exclude holiday periods, academic vacations, etc.

Few attempts have been made to assess the volume of demand, presumably largely because of the difficulty of doing so. The best studies are Palmour (1972) (restricted to academic libraries in the USA); Line and Steemson (1978) and White (1986) (both relating to UK).

5.2 RANGE OF RESOURCES AVAILABLE (see also chapter 2.5)

The extent, in volume and nature, of resources available to a document supply system is clearly an important factor, since it determines its ability to satisfy demands and needs. The sheer quantity of resources is in itself less important than the relevance of the resources, namely the closeness of match between them and potential demands. This is very difficult to assess in most systems, because only those items can be requested that are located. The fill rate will not therefore serve as a measure. Studies of user needs, as suggested in chapter 4, can go some way towards measuring range and relevance, since they should

identify a percentage of wanted items that cannot be found in the system.

A dedicated supply source that accepts blind requests (see 5.3 below) can tailor its resources to demand to a large extent, and even to need.

5.3 ABILITY TO ACCEPT BLIND REQUESTS AND TO EXTEND RESOURCES

Some systems are able (and planned to be able) to accept only a limited range of requests - limited either by subject or by sector (eg industry, academic institutions) or by form (eg serials), or in that only items for which a specific location is found can be requested. This last is the case with totally decentralized systems depending on cooperation among a number of libraries and on direct requesting between them.

Dedicated supply sources or switching centres may however be willing to accept requests 'blind', and either to acquire the items in question for their own stock if not already held, or to search for them in other sources, at home or abroad. This capacity to accept blind requests and take action in response to them is particularly valuable, because the resources available can then be extended as need dictates. This can be achieved in a cooperative system if a requesting library when unable to locate an item acquires it for its own stock and subsequently makes it available to others as required; but this is less likely to occur than

with a dedicated source, if only because some items will be expensive or require continuing expenditure (eg serials) and therefore not be considered justifiable purchases for what may be a single use.

The ability to accept blind requests, and the ability to respond to demand by extending resources, either exist or they do not; they cannot be measured. They are nevertheless important characteristics of a document supply system, and should not be omitted from any assessment, absolute or comparative.

5.4 ROBUSTNESS AND FLEXIBILITY

Robustness and flexibility constitute the ability of a system to deal with the expansion of demand, changes in the nature of demand, sudden fluctuations (in particular peaks) in demand, and crises such as transport and postal strikes and telecommunication failures. Robustness and flexibility are distinguishable - expansion requires robustness and crises require flexibility - but they are not easily considered separately, since the features needed for robustness overlap with those needed for flexibility.

In general, remote demand for documents can be expected to grow gradually, but there may be exceptions. If a country with little or no facilities for document supply establishes some, demand can easily rise from a few hundred to several thousand a year in two or three years. Even in countries with developed facilities, growth rates may easily be

as high as 5% or even 10% a year for several years as more and more latent need is tapped or as local library acquisitions diminish. If this is true nationally, the growth of demand experienced by particular systems can be much greater, especially when new and more efficient systems or suppliers come into being. Two striking examples are the OCLC ILL subsystem in the US and the National Lending Library for Science and Technology in the UK (later the British Library Lending Division and more recently the British Library Document Supply Centre). In both cases factors in the growth of demand were the ability to handle large increases - in short, robustness. The reasons for robustness differed: in OCLC it was the involvement of very large numbers of libraries, in BLDSC it was the initial design of very simple procedures and the avoidance of any unnecessary complexities.

The capacity to deal with peaks in demand is rather easier to achieve with a decentralized system, but a centralized system can cope well provided that the peaks are reasonably consistent from year to year (as they are in the UK), so that they can be planned for to some extent; this does however require flexibility of staffing and some flexibility with procedures (if, for example, all the reprographic machines are in full use it may be possible to lend some serials instead).
Changes in the nature of demand might be in the form of, eg, a gradual change in the balance of demand for monographs and serials, perhaps leading to much greater demand for photocopies rather than loans; or there might be a switch from humanities towards science, or within science from the physical to the life sciences. Any large changes of this kind can put strain on a system.

The ability to cope with crises requires flexibility and imagination, though there are some crises that are beyond any flexibility to cope with. A major disaster in a central supply source is clearly far more serious than in a decentralized system. Postal strikes may be partially overcome by the use of other carriers. The extensive use of telefacsimile and other methods using telecommunications avoids transport problems, but this makes the system very vulnerable to telecommunication breakdowns and some kind of emergency support system is desirable. As far as possible, reasonable contingencies should be prepared for in advance and total dependence on either physical transport or telecommunications should be avoided.

Failures of robustness and flexibility are generally seen quite quickly in reduced supply speeds and possibly lower fill rates. It is more useful to assess the robustness and flexibility of a system before they are put to the test. This can be done by a rigorous study of the system's ability to cope with growth or problems, and possibly by a 'dry run' - a simulation of an emergency or a different pattern of demand to see how the system copes in practice.

In short, robustness and flexibility are important features, particularly with centralized systems, and need close examination, possibly including experimental tests.

5.5 EASE OF USE

How easy a system is to use may seem a rather trivial feature compared with fill rate or speed. However, it has been shown that human beings often tend to go for convenience rather than proven performance, and may use a simple system with a 60% chance of success in preference to a complicated one with an 80% chance of success. Complications may include procedures for requesting or payment mechanisms, either of which may be complex or simply different from those customary elsewhere. Use is also made more difficult by the need to use several union catalogues to locate items, or by union catalogues that are not designed for rapid consultation.

A symptom of difficulty in use is a low volume of demand for a system that can achieve a high fill rate and rapid speed of supply. More obvious indicators are complaints from users.

The obvious remedy is to scrutinize the system with ease of use and customers' needs and habits in mind: it is surprisingly easy to design systems that look reasonable on paper but have not taken users sufficiently into account. Accounting requirements of institutions, or the need to keep many records of items supplied to satisfy the demands of institutions, can be serious barriers to simplicity, but usually a good deal can be done within the system itself.

The best way to measure success in achieving ease of use is to survey users, whether they are asked to give their comments only on the system in question or to compare it with other systems. They need to be asked not only whether it is easy or difficult to use but in what respects if any they find it difficult.

It may be noted that simplicity of procedures can both assist ease of use and aid robustness.

5.6 QUALITY

'Quality' can be the overall quality of a system as perceived by customers (see Stone (1984)) or specific aspects such as the legibility of photocopies or items transmitted by telefacsimile (see Boss and Espo (1987) and Anand (1987)), the accuracy of a system (ie a low error rate), or even the design of stationery (which may also affect ease of use). In the case of a system that charges commercial costs, quality should be assessed by commercial standards. Poor quality can affect demand, and a decline in quality may become visible by a decline in demand.

The operators or designers of the system need to pay continuous attention to quality; and major supply sources should build in some kind of quality control. Some aspects of quality are largely within the control of requesting libraries, eg the accuracy of requests. As with ease of use, the only way to measure quality apart from internal scrutiny is to survey users; and here again users should be asked to be specific about weaknesses.

5.7 MINIMAL DAMAGE AND LOSS

Any document supply system carries the danger of damage to documents,

and if it lends originals as well as providing photocopies it carries the danger of loss also.

Loss can occur if the requesting library or the user loses an item, but these are beyond the control of the system as a system and can occur equally (indeed, the probability of its occurrence is greater) with the library's own stock. Loss of this kind can be minimized by the use of photocopies or microfilms in place of the original, by the keeping of good records, and, in cases of valuable items, by ensuring that they are used only in the requesting library.

Loss is most likely to occur in transit between the source and the requesting library (in either direction). This is within the control of the system only insofar as more secure methods of transport are available for use.

The loss rate is easy for the supply source to measure, but it is less easy to establish loss rates for a syste or a country. The loss rates of different transport systems need to be compared, and the reasons for losses need to be explored.

Damage can occur in transit or in use at the requesting library. This can be reduced by good packing and the use of transport systems with a good record of careful carriage, and it can be reduced further by the use of copies (photocopies or microfilms) in place of the original. However, the making of copies can also damage items, particularly where they are tightly bound; and repeated copying is

certain to result in deterioration. This kind of damage can be reduced by duplication of items in heavy demand or the making of a single master copy from which other copies are subsequently made.

Damage as a result of document supply is impossible to measure in any systematic way, particularly since in most libraries any damage could have been caused by their own clienteles. Its effects usually become visible gradually, though spectacular damage is of course immediately apparent. It appears impossible to construct any meaningful quantitative measure that can be used for comparison.

5.8 BALANCE AND FAIR DISTRIBUTION

Several studies (eg Turock (1985)) have examined the extent to which demand and supply are distributed fairly among supply sources, whether 'fairness' means in relation to the size and capacity of the source, or evenness (ie more or less equal numbers of requests going to different sources). This is a valid performance measure only if fairness of distribution is an objective of the system, as it may well be in cooperative schemes where no payment is made for supply. It can be studied by the collection of data on demand received by a sample of libraries in the same system.

Another and related aspect of balance that has been used is the request:supply ratio for individual libraries. It is not at all clear what this measures, and it is hard to see how it can be a measure of performance. Since libraries differ greatly in size and nature of

stock, it would be surprising if demand and supply were in balance, and attempts to make them so artificially could distort the system and lead to a poor performance. A high supply:request ratio can lead to inadequate performance if some supply sources are overloaded and in consequence give a poor service. If a high ratio in either direction does result in inadequate performance it is a sign that the system is poorly designed, since a well designed system would take this into account.

If the ratio needs to be measured, it must be measured in individual libraries. A sample of libraries is adequate to indicate whether imbalances are serious or widespread.

5.9 ABILITY TO SERVE DIFFERENT SECTORS

A system may be set up to serve one or two particular sectors, eg commerce and industry, or academic institutions, exclusively or primarily. This is often the case with cooperative systems, where academic institutions and industries may have separate systems. However, most systems perhaps aim to serve all sectors, and their performance in serving them equally therefore deserves to be assessed. This can be done if studies of fill rate and speed (see chapters 2 and 3) permit analysis by type of requesting library.

5.10 EASE OF MONITORING

Since measures of performance are important, it goes without saying that a system should as far as possible be designed to yield data that can be used for measurement. Without this improvement of performance and elimination or reduction of weaknesses are difficult to achieve. The ability of a system to yield performance data is therefore itself a measure of its performance.

6. COSTS

6.1 THE RELEVANCE OF COSTS TO PERFORMANCE

Strictly speaking, costs (an input) are not a measure of performance (which is output), but for practical purposes they cannot be ignored in any discussion of performance of document supply systems, whether from the viewpoint of the requesting library, the supply source, or the system planner or manager. It would be theoretically possible to have a comprehensive acquisition policy, a superb location system, very efficient procedures, and fast requesting and supply times - at an impossible cost. Ultimately all systems have to operate within constraints of cost (and staff time, which is money); if one system can provide as good a fill rate, speed of supply etc for a given number of requests as another at lower cost it is clearly a superior system.

It was noted in chapter 1.1 that some document supply is carried out by commercial firms, and also that non-commercial libraries (including publicly funded libraries) may act commercially when supplying documents. A commercial firm has to make a profit to survive, and although a firm involved in several activities might decide to subsidize document supply for one reason or another (usually to attract use to a profitable service offered by the firm), in most cases it can be assumed that the total costs (see 6.3) of document supply will be recovered. Libraries that charge may make a nominal charge, perhaps

to discourage excessive demand, or they may aim to recover all direct costs, or possibly total costs. In cases of full cost recovery, whether direct or total, the market (ie demand) is the ultimate performance measure; commercial companies stand or fall by the market, and may be little interested in more detailed measures of performance except insofar as they show how they compare with competitors or could be used to increase their profit margins.

6.2 THE APPLICATION OF COSTS

For planning purposes, it is useful to compare the total costs of different possible national or other systems. For system designers and managers, the costs of day-to-day operations (ie excluding acquisition costs) need to be compared. Requesting libraries need to know the comparative costs of using alternative supply sources and different requesting methods. Finally, supply sources need to know the comparative costs of different methods of handling requests and supplying items, as well as to study their own efficiency of operation. A commercial supplier, or any supplier that acts commercially when supplying documents, has to know its costs in order to operate.

Costing information may be used not only to plan systems, manage systems and make choices, but to set prices if charges are made, whether by a supply source to a requesting library or by a requesting library to a user. Charges are increasingly common in countries with

commercial suppliers, with centralized supply sources, or with numbers of transactions that are so large as to cause problems for a 'free' system. Some libraries are also passing on costs to users; even if this is only a nominal charge to restrain demand, it is useful to know the true costs. (It should be said that if a library passes on substantial or full costs its incentive to choose the most cost-effective system is thereby reduced).

The comparative costs of using different systems are of course affected by whether the supply source makes charges. Charges are conspicuous but may well involve less cost than the various other processes involved, including hidden costs (see 6.3 below). A simple charged system may involve less total expenditure than a complex 'free' (or rather uncharged) system. Secondly, when two alternative suppliers use different charging policies, one giving a 'free' or subsidized service and the other recovering full costs, requesting libraries may choose the cheaper system even though it has a lower fill rate and a slower speed of supply and incurs higher costs. This is more economic from their angle, but in national terms is uneconomic, since the more efficient system is penalized and the total national costs incurred are higher. Local economics may thus clash with national economics. The policy issues involved are not discussed here, but the point is worth making that subsidized systems make true economic decisions more difficult and efficient national systems less likely to be achieved.

Fomparison is difficult even with unit costs. Within a country, comparisons over time need to take into account the changing value of money, but this is not a serious problem. Between countries, fluctuating exchange rates and different relative costs for different types of goods and services make comparison very difficult; for example, in one country labour is cheap and materials are expensive, while in another the opposite is the case. For these reasons, cost comparisons between countries should be used only with the greatest caution. However, comparisons can be made of staff time spent; and actual costs can be compared for countries of similar types, economies and stages of development (eg in Western Europe, it would be reasonable to compare France with Germany).

6.3 DIFFERENT TYPES OF COSTS

It is essential to distinguish different types of costs. They may be:

Direct: the costs incurred directly in document supply transactions, excluding capital costs (such as acquisitions) and indirect or overhead costs (such as accommodation and management: see below). They should include consumables (such as paper for photocopying), depreciation on machinery, and possibly depreciation on stock (to allow for wear and tear caused by document supply).

Total: the full costs, including overheads and indirect costs. In the case of document supply, total costs would include the acquisition of material to meet demand, an element of senior management costs (eg a portion of the librarian's salary would be attributed to document supply), accommodation overheads, and so on.

Direct costs are usually easier to calculate accurately than total costs, and it is therefore desirable to express Direct costs and Overhead costs separately.

Distinction also has to be made between:
Visible costs: the costs of forms, postage, paper, etc; and
Hidden costs: in particular the time of staff who are employed anyway and who devote some of their time to document supply.

Some costs may be visible in one institution (eg where a telex machine is used solely for document supply, or two or three staff are concerned solely with document supply) and hidden in another (where use of machines and staff is occasional and not full time).

It may be useful to divide Direct costs into Visible and Hidden costs. Visible costs are much easier to calculate.

Finally, it is useful to distinguish between
Fixed costs, such as accommodation, equipment and stock; and
Running costs, such as telephones, postage, etc.

These approximate respectively to Overhead and Direct costs, but they are not identical; senior management overheads, for example, are not fixed. Equipment such as a telefacsimile transceiver incurs both fixed and running costs. High fixed costs yield high unit costs (see below) unless the volume of demand is high, when economies of scale are achieved; while running costs are roughly the same per unit. A system with high fixed costs and low running costs benefits much more from increased demand than one with low fixed costs and high running costs, since marginal costs are lower.

6.4 THE CALCULATION OF COSTS

Distinction needs to be made between

Service or system costs: the (usually) annual costs of the system or service, whether direct or total; and

Unit costs: the cost per unit transaction. The 'unit' may be a request, a completed transaction, or a filled request: the last is the most meaningful measure and the best for comparative purposes.

Service or system costs are useful for an institution that wishes to know how much a given activity is costing (eg a library may wish to know how much it is spending on document supply as compared with service to its own readers). They are useless for purposes of comparison over time or between systems or countries, but they have of course to be computed before unit costs can be calculated. Unit costs have to be used as the main cost performance measure.

In calculating unit costs per completed transaction or per filled request, all costs, whether direct or total, including those incurred for unfilled requests and uncompleted transactions, have of course to be taken into account. It may also be worth calculating separately the unit costs per filled request and per unfilled request using only those costs directly incurred in filling or not filling requests. If, for example, the cost of an unfilled request is a good deal higher than of a filled request, this may suggest that acquisitions should be extended.

Costs may be broken down into:

- Costs to the requesting library
- Costs to the supply source
- Costs to any central unit responsible for planning and management
- Costs to the system or nation.

In calculating total costs, care must be taken in cases where the supply source passes some or all of its costs on to requesting libraries, since some of the same costs are then incurred by both and these must not be counted twice.

As stated above, some costs are relatively easy to calculate: for example, the cost of photocopying paper, request forms, or packing and postage. Unfortunately these account for only a minor proportion of all costs.

The costs of acquisitions to meet demand are fairly easy to calculate in a highly centralized supply system, much less easy in decentralized

acquisition systems. The costs of processing and storage need to be included as well as the purchase price of aterial.

Staff costs can be calculated only by calculating time spent and converting it into money. A common method of calculating time spent is by detailed work study over a period, but this is intrusive, and it can also affect the operations being studied because staff know they are being watched. Sample observations over short periods may overcome these objections to some extent. Self-completed diaries are another common method. These can be satisfactory if they cover the whole day; otherwise the time devoted to one activity is liable to be underestimated. One problem with them is that they occupy some of the time they are trying to analyse. Finally, staff can be asked to produce estimates of the proportion of time devoted to particular activities; this is not very reliable but it is relatively simple.

The conversion of time into money can be done fairly precisely, according to what each member of staff actually earns (plus provision for such items as insurance, pensions etc), or, more satisfactorily for comparative purposes at least, by using a figure for the median or other agreed point on a salary or wage scale. (As noted above, for comparisons between countries time should generally not be converted into money).

Much depends on the level of detail that is required. If the efficiency of the operation is under review in a requesting library or supply source, a good deal of detail on use of staff time may be

needed to identify points of weakness or high expenditure. For more general purposes, total staff time may be sufficient, though it is useful to have it broken down by level of staff. In some cases, eg where it is suspected that a system is difficult to use, a more detailed analysis may be revealing (it may, for example, show that a high proportion of time is spent locating items or completing and transmitting requests).

There may be even more specific requirements. For example, a supply source or requesting library may wish to know the comparative costs of handling requests for scientific serials and humanities monographs. In such cases, staff time would have to be calculated and analysed accordingly. This information would in fact be valuable for comparing two systems or countries which handled requests for different kinds of material in different proportions.

It is clear that no costing exercise can be carried out satisfactorily unless its purposes are clearly defined. The best solution is to carry out some general standard costings - standardized as far as possible within countries and between countries - and to supplement these by specific exercises as required. However, it is possible to compute standard costs only by first calculating the components of the costs; and it is possible to use them for comparison only if the same components are included, and known to be included, in all cases.

For some activities, particularly those involving the use of automation or electronic transmission, costs can change rapidly and

dramatically. Costing exercises therefore need to be carried out at fairly frequent intervals.

Costs are calculated in more or less detail in several studies. These include: Cossar (1973); Palmour (1972); Ford and Ford (1975), Harris and Marsterson (1975) and Smith (1983) - all three cost comparisons of using different systems; Boss and Espo (1987) and Anand (1987) - costs of telefacsimile transmission; Roberts (1981); and, much the most detailed, Spencer (1971). Great Britain, Department of Education and Science (1972) contains one of the few attempts to calculate comparative costs of alternative national systems.

7. PROPOSALS FOR PRACTICAL PERFORMANCE MEASUREMENT

7.1 INTRODUCTION

It will be clear from the preceding chapters that while the main basic performance measures - fill rate, speed, user satisfaction and cost - are simply stated, none of these measures is in fact simple and some, like fill rate, have serious limitations; careful definitions and various subanalyses are needed for all of them. Their application too is not at all easy. In addition to these basic measures, there are numerous other measures of greater or lesser importance.

Not only is the process of measurement difficult, but the measures need to be applied by different bodies - variously requesting libraries or supply sources - and they need to be coordinated centrally.

7.2 COMBINED MEASURES

It is not satisfactory to measure only one aspect of performance in isolation. The reasons for this are obvious. As noted in chapter 6.1, it would be be theoretically possible to have very high fill rates and very fast supply times by means of a very comprehensive acquisition policy and a system designed specifically for remote supply at the expense if necessary of all other services. Such a system would

anticipate most users' needs, should be able to achieve high quality, should (because specifically designed) be very simple to use, and should satisfy also several of the other minor criteria such as robustness and ability to accept blind requests. It would also be very expensive. The nearest to such a system is the British Library Document Supply Centre, which has a budget (in 1987-88) of over £19 million - an expenditure that could be justified only by a very large volume of demand and consequent fairly low unit costs.

In most countries such a system is not conceivable; the total potential national demand would be too small, while demand from other countries could be attracted only by taking it away from other similar systems (for this reason also the number of such systems is bound to be limited). Where a centralized collection is not at the heart of a document supply system, various trade-offs have to be considered: not only fill rate and speed against cost, but possibly also fill rate against speed. Most countries could improve their fill rates considerably if the time that could be spent on requests was limitless. Likewise, high quality could be ensured at the cost of speed and money.

It therefore makes sense to conduct performance measurement as a total exercise. This does not mean that all measures have to be pursued at the same time, though it may be convenient to do so; it does mean that they should be coordinated.

Another reason for close coordination is that often the same data can be used to construct more than one measure. For example, if a national survey is conducted, requiring many individual libraries to collect data over what may be quite a substantial period of time, it is much cheaper and more convenient for them to collect a variety of data on the same requests than on different requests at different times, particularly if additional codings (eg by subject and date) are used. Using the same requests for different analyses also adds validity to examination of trade-offs.

Additional analyses relating fill rate to supply time may also be possible. This still leaves open the possibility of more limited special surveys to study quality and other factors.

7.3 LEVELS OF PERFORMANCE MEASUREMENT

The main requirements of any system for measuring performance are that it should do what is required of it (ie measure performance) and that it should be practicable. In chapter 1.3, six objectives of performance measurement were listed. Three of these are of interest to planners, whether at a national or sub-national level, one to suppliers, the other two to local libraries in deciding between systems and methods. The data collected should permit the necessary analyses to be made.

If an attempt was made to use all the measures stated as ideal or desirable in the earlier chapters of this report, a very complex and time-consuming system would result. In reality, little time would actually be consumed, because the data would simply not be forthcoming. A performance measurement system should be as simple as possible, demand as little time and effort as possible, be clear and unambiguous in its terminology and data collection method, and be employed no more frequently than necessary. Except possibly with a sophisticated automated system (see 7.7), or with very few requests, routine data collection covering all requests is precluded by the amount of work involved.

Two levels of performance measurements are suggested here: a basic set, regarded as essential for any system however small, and a highly desirable set to which systems should aspire. Both sets include some optional measures, from which selection can be made as desired and as practical circumstances permit.

The importance of standardization, over time and across countries, was stressed earlier (chapter 1.3); without the possibility of comparison measurement loses much of its value. It is hoped that the measures proposed here may form the basis of commonly accepted standards.

7.4 LEVEL 1: BASIC MEASURES

Level 1, the basic level of performance measurement at which all countries should aim, measures fill rate, speed, and volume. The same form would be used for all three.

Frequency of data collection and analysis: Every 3 years. In a time of rapid development, more frequent surveys (annual) should be carried out to measure the effects of changes in the system.

Number of requests to be analysed: If fewer than 200 requests a year are made, the outcome of all requests should be studied; if more than 200, a sample of 200 at least, preferably 500, should be drawn, by sampling libraries (stratified random sample) where there are numerous libraries, or by sampling requests, either (preferably) all requests over a limited period of time or a random sample over a longer period. (See chapter 2.7).

Responsibility for data collection: With requesting libraries, except in totally or very highly centralized systems, where the supply source or sources can collect the data.

Elements to be coded:

Form (monograph, serial, other printed, audiovisual)

Type of requesting library (academic, public, special)

Result of request (filled, failed, not filled by date of survey analysis)

Elapsed time in days from despatch of request to receipt of item (processes b to d in chapter 3.4) or abandonment or conclusion of survey in the case of requests still pending

Type of supply source (national library, academic library, public library, special library; commercial supplier; foreign source. In the case of one or a few specially useful sources, these should be coded individually).

Method of data collection: Survey form (see below, 7.6). Forms would be gathered in 3 months after the date of the last request to be analysed (ie if the survey period was April 15-28, forms would be collected at the end of July; if all requests over a year were analysed, forms would be collected at the end of the following March).

Analyses

Fill rate: Overall

By form of material

By type of supply source

By speed

Speed: Overall

By form of material

By type of supply source

Estimated volume: Overall

By form of material

By type of requesting library

The volume of requests would be calculated by multiplying the number of requests analysed as appropriate. The results would be only approximate, since there would be no guarantee that the period of data collection was typical; multiplying requests over a two-week period by 24 or 25 (rather than 26, to allow for holidays etc) would give an indication of the annual total but no more. If libraries are sampled, the appropriate multiplication factor becomes still more difficult to establish; and if multipliers have to be used for both the period and the libraries, error can easily be compounded. Nevertheless, volume is so important a measure, both in its own right (see chapter 5.1) and as an indicator of how much potential demand is translated into actual demand (see chapter 4.2b), that estimates should still be made.

For reasons of comparability over time, especially when estimates of total volume are made, it is highly desirable to use the same sampling period, and possibly also the same sample of libraries, for every survey carried out.

Optional measures.

a. Costs. In countries with a very small number of requests, it is not necessary to do detailed costing studies, but these should be carried out when demand exceeds a certain level (say 1,000 a year). It is more important that in a country which is considering which system or systems to develop an estimate should be made of the likely total cost of alternative systems, and this would normally involve costing of the present system or procedures. (See chapter 6).

b. User needs. Efforts could also be usefully made from time to time to collect direct information on the needs of users for documents and how far they are translated into demands (see chapter 4.2a, and the sample data collection form in 7.6).

Both a and b would be organized by a central body, though costings of procedures would be done in individual libraries and supply sources.

7.5 LEVEL 2: DESIRABLE MEASURES

These are measures that go beyond a basic level but that should be implemented as soon as possible.

a. Fill rate, speed and volume

Frequency of data collection and analysis. Every 2 years; annually if changes have been made to the system.

Number of requests to be analysed. As in 7.4 above, but a sample of at least 500 should be aimed at.

Responsibility for data collection. As in 7.4 above.

Elements to be coded:

Form (monograph, serial, other printed, audiovisual)

Subject (humanities, social sciences, science and technology, miscellaneous; or humanities, social sciences, medicine, agriculture, science and technology, miscellaneous)

Date (see chapter 2.3)

Type of requesting library

Result of request

Elapsed time in days from request to receipt of item

Type of supply source

Method of supply (loan, photocopy, microfilm)

Reasons for failure (optional - see d, Failure analysis, and chapter 2.4).

Method of data collection. As in 7.4 above, with different survey form (see 7.6)

Analyses

Fill rate: Overall

By form of material

By subject

By date

By type of supply source

By speed

If desired and if sample size permits, further analyses can be made by form and subject, by form and date, and by subject and date.

Speed: By form of material

By subject

By date

By type of supply source

Further analyses can be made as for Fill rate above.

Estimated volume: Overall

By form of material

By type of requesting library

b. Speed: detailed analyses. The time involved in each of the processes a-e in chapter 3.2 would be calculated, as a separate exercise from the main survey. The data would also contribute to the calculation of costs (below).

c. Costs. Detailed costing studies should be carried out in a small sample of libraries, both requesting and supplying, of different kinds, with the breakdown of costs indicated in chapter 6.4. From these, the average costs of component elements would be calculated, as would the total costs of different systems. Costings should be standardized and organized by a central body.

d. Failure analysis.A sample of failed requests should be collected (minimum number 100, preferably 200) and analysed by form, subject and date to see what patterns emerge. Reasons for failure (see chapter 2.4) can be examined only by adding further

codings to all requests in the main sample, or, if this is not possible, by a special study.

If the former method is used, the additional codings to be used on the survey forms are as follows:

Reasons for non-supply (optional): material

By form of material

By subject

By date

By type of supply source

Further analyses as required.

Responsibility for coding would rest with the supply source.

Optional measures.

a. User needs. As 7.4, but efforts should (rather than 'could') be made from time to time to collect direct data. This would be organized by a central body but carried out in local libraries.

b. User satisfaction. At the same time, users' views should be sought on their opinions of document supply services, eg speed, timeliness, quality, and ease of use. The views of requesting libraries on such matters should be sought at the same time. This inquiry also would be organized by a central body, but carried out in local libraries.

7.6 SAMPLE SURVEY FORMS

Sample forms are given here for Levels 1 and 2 and for assessment of user needs. Special forms may be needed for other measures suggested in the report, but these are less vital and/or are too subject to local circumstances (as in the case of costings) to make sample forms useful.

a. Level 1 : basic data

DOCUMENT SUPPLY SURVEY

Type of library:

National 1 ☐
Academic 2 ☐
Public 3 ☐
Special 4 ☐

Use one column for each request

Use only one code for each box

Complete all boxes for each request

	1	2	3	4	5	6	7	8	9	10
Form of material M S OP AV										
Date request despatched (eg 11/2 = 11 February)										
Date item received or request abandoned (use code as above)										
Result F NF A C										
Source N A P S C F										

NOTE ON CODES

Form of material

M Monograph
S Serial
OP Other printed
AV Audiovisual

Result

F Filled
NF Not filled
A Abandoned (no response, etc)
C Cancelled (by requesting library)

Source

N National library
A Academic library
P Public library
S Special library
C Commercial supplier
F Foreign source

b. Level 2 : desirable measures

DOCUMENT SUPPLY SURVEY

Type of library:

National 1 ☐
Academic 2 ☐
Public 3 ☐
Special 4 ☐

Use one column for each request

Use only one code for each box

Complete all boxes for each request

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Form of material M S OP AV															
Subject H SS ST M															
Date 1 2 3 4 5 6 7															
Date request despatched (eg 11/2 = 11 Feb)															
Date item received or request abandoned (use code as above)															
Result F NF A C															
Source N A P S C F															
Method of supply L P M															

NOTE ON CODES

Form of material

M Monograph
S Serial
OP Other printed
AV Audiovisual

Result

F Filled
NF Not filled
A Abandoned (no response, etc)
C Cancelled (by requesting library)

Source

N National library
A Academic library
P Public library
S Special library
C Commercial supplier
F Foreign source

Subject

H Humanities
S Social Science
ST Science and Technology
M Miscellaneous or unknown

Date*

1 1986-90
2 1976-85
3 1956-75
4 1936-55
5 1900-35
6 1800-99
7 1700-79

Method of supply

L Loan
P Photocopy
M Microform

* This is for a survey carried out in 1990. The same intervals would be used for surveys carried out in other years.

c. User needs

This form is intended for users to complete, and is aimed at assessing the volume and nature of their document needs and how far they may be constrained by local provision or poor expectations. It is important that wherever possible users asked to complete such forms are seen personally so that the purpose and nature of the enquiry are understood and any uncertainties about use of the form cleared up.

INQUIRY INTO DOCUMENT NEEDS

Please note on this sheet all publications to which you are alerted in the next two weeks (or whatever period) by whatever means, and which you would like to see; and what action you have taken on each item.

Item no.	1	2	3	4	5	6	7	8	9	10
BRIEF REFERENCE* (eg BBActa 1985, Smith 1979)										
TYPE OF MATERIAL										
Book										
Journal										
Other										
HOW NOTIFIED										
Computer Search										
Abstracting or indexing journal										
Reference in book or journal										
Personal information										
ACTION TAKEN										
In personal collection										
Borrowed from colleague										
Order from bookseller										
Searched library:										
successful										
unsuccessful										
Put in interlibrary request										
Other										

* This is intended as an aidemémoire for yourself

7.7 THE USE OF AUTOMATED SYSTEMS TO PRODUCE PERFORMANCE DATA

The collection of data for performance measurement is a tedious, staff-intensive and expensive exercise, and it is therefore useful to see whether the necessary data can be collected as a matter of routine. For the reasons given in 7.3, this is not conceivable with manual systems, but automated systems ought to provide at least some of the data more or less automatically.

Supply times can be provided if the request record has a date added to it at various points (see chapter 3.4 and 7.6); this can be automatic for some points, but the dates of receipt of requests and dispatch of items by the supply source would have to be fed in separately. Presumably also any automated system would record whether a request was filled or not. An identification code for the requesting library could also be easily included automatically. A good deal of basic information, and some detailed information (on the time taken for various processes), should therefore be forthcoming.

However, it is suggested above (7.4) that even basic (level 1) measures require coding by type of material and supply source, and these codes would have to be entered specially. For level 2 measures, subject and date are also required. If it is not considered reasonable to code all requests in this way, a sample of requests could be so coded for a national survey to produce the same results as for libraries collecting data manually, only more simply.

It will be a long time before all libraries in any country have automated document requesting systems, and any national attempt at performance measurement must therefore be able to accept data from manual as well as automated systems. Some automated interlending packages are already available (though unfortunately they do not generally seem able to provide any measures but fill rates), and more will doubtless appear. There is no realistic possibility that the relevant files of numerous libraries, which will use a variety of different software and hardware, can all be fed into one computer system and processed to produce the overall national analyses required, so the central body responsible for performance measurement will have to collect already processed data from libraries and subject it to further processing.

It is strongly recommended that all automated document requesting systems should have built into them automatic provision for adding dates at various stages in the process, and standard codes for fill rate, form of material, subject and date; the use of the last two of these could if necessary be restricted to national survey purposes, but the others should be completed for all requests.

7.8 RESPONSIBILITY FOR DATA COLLECTION, COORDINATION AND ANALYSIS

From the foregoing (see especially 7.4, 7.5 and 7.6), it is clear that most data, including all basic data, has to be gathered in requesting libraries. Some elements of costing, and failure analyses, can be done

only in supply sources. Some evaluation must be carried out by a central body, such as general cost comparisons of alternative models and general assessments.

If the necessary standardization is to be achieved, all surveys and evaluations must be planned and coordinated by some central body, which must also be responsible for analysis and reporting. What sort of body this should be must be a matter for each country to decide: it could be a national library, a library association, or a government department. The responsible body would not necessarily do the detailed work of designing studies, distribution and collection of forms, and analysis: this could be contracted to a research team or an individual. It cannot however be too strongly emphasized that the overall responsibility must lie with a central body with appropriate status and authority.

REFERENCES

Anand, Havelin (1987). Interlibrary loan and document delivery using telefacsimile transmission, part II: Telefacsimile project. Electronic Library, 5(2), April 1987, 100-107.

Arms, William Y (1973). Duplication in union catalogues. Journal of Documentation, 29(4), December 1973, 373-379.

Arms, William Y (1979). Models for interlibrary lending. Interlending Review, 7(4), October 1979, 130-136.

Baker, Shirley K (1982). The efficacy of interlibrary loan: a study of response time for interlibrary loans submitted by mail, TWX, and an automated system. In Options for the 80s: proceedings of the second national conference of the Association of College and Research Libraries. Greenwich, CT: JAI Press, 1982. pp.595-604.

Barr, Diana and Farmer, Jean (1977). Waiting for inter-library loans. BLL Review, 5(1), January 1977, 8-12.

Budd, John (1986). Interlibrary loan service: a study of turnaround time. RQ, 26(1), Fall 1986, 75-80.

Clarke, A S M (1980). UK speed of post survey, 1980. Interlending Review, 8(3), July 1980, 100-101.

Clarke, Ann (1982). The British Library Lending Division's 1981 success rate survey. Interlending Review, 10(1), January 1982, 18-20.

Cossar, Bruce (1973). Interlibrary loan costs. RQ, 12(3), Spring 1973, 243-246.

Ford, Jill and Ford, Geoffrey (1975). The cost and supply delays of interlibrary loans at the University of Lancaster Library. BLL Review, 3(2), April 1975, 47-50.

Freeman, C (1973). Inter-library loans. Australian Library Journal, 22(11), December 1973, 462-466.

Great Britain, Department of Education and Science (1972). The scope for automatic data processing in the British Library. London: HM Stationery Office, 1972 (Annex D: Interlibrary lending and copying).

Harris, K G G and Marsterson, W A J (1975). Interlibrary book borrowing: a little analysis of services provided through the Northern Regional Library System and through the British Library Lending Division. BLL Review, 3(2), April 1975, 51-54.

Houghton, B and Prosser, C (1974). A survey of the opinions of British Library Lending Division users in special libraries of the effects of non-immediate access to journals. Aslib Proceedings, 26(9), September 1974, 354-366.

James E Rush Associates, Inc. Library systems evaluation guide, volume 6: Interlibrary loan. Powell, OH: James E Rush Associates, 1985.

Kunz, E F (1979). A survey of interlibrary loan requests directed to the Australian National University Library. Australian Academic and Research Libraries, 10(3), September 1979, 137-149.

Lancaster, F W (1977). The measurement and evaluation of library services. Arlington, VA: Information Resources Press, 1977.

Line, Maurice B (1973). The ability of a university library to provide books wanted by researchers. Journal of Librarianship, 5(1), January 1973, 37-51.

Line, Maurice B and Steemson, Robert J (1978). Interlibrary lending in the United Kingdom: report of a national survey carried out in February 1977. [London]: British Library, 1978. (BLR&D Report 5417).

Line, Maurice B and others (1980). National interlending systems: a comparative study of existing systems and possible models. Paris: Unesco, 1980. (PGI/78/WS/24(Rev.)).

Line, Maurice B (1983). Performance assessment at national library level. In Do we really need libraries? Proceedings of the first joint Library Association Cranfield Institute of Technology conference on performance assessment, ed. John Blagden. Cranfield: Cranfield Press, 1983. pp.25-42.

Merry, Karen and Palmer, Trevor (1984). The British Library Lending Division's 1983 demand/supply survey. Interlending and Document Supply, 12(3), July 1984, 101-103.

Novak-Booth, Jan (1982). Interlibrary loans traffic at the ANU in 1981. Australian Academic and Research Libraries, 13(1), March 1982, 50-55.

Palmer, Trevor (1985). The British Library Lending Division's overseas photocopy survey, 1984. Interlending and Document Supply, 13(2), April 1985, 47-48.

Palmour, Vernon E (1972). A study of the characteristics, costs, and magnitude of interlibrary loans in academic libraries. Westport, CT: Greenwood Publ.Co., 1972.

Parker, J Stephen (1982). Document delivery systems in Southeast Asia: a review. In Access to information: proceedings of the fifth congress of Southeast Asian librarians... May, 1981. Edited by D E K Wijasuriya (and others). Kuala Lumpur: CONSAL V, 1982. pp.435-464.

Pilling, Dennis (1987). Speed of document delivery from BLDSC to overseas users. Interlending and Document Supply, 15(1), January 1987, 12-15.

Roberts, Stephen A (1981). Internal costs of interlibrary lending in British university libraries. Interlending Review, 9(3), July 1981, 101-103.

Ross, Richard W and Espo (Hal) (1987). The use of telefacsimile in libraries. Library Hi-Tech, 5(1), Spring 1987, 33-42.

Rouse, Sandra H (1975). A selected review of the literature on interlibrary loan networks. Network, 2(1), January 1975, 17-25.

Rouse, William B (1976). A library network model. Journal of the American Society for Information Science, 27(2), March-April 1976, 88-99.

Sanner, Lars-Erik (1983). Interlending in the Nordic countries. Nordisk Tidskrift for Bok- och Biblioteksvasen, 70(1), 1983, 3-12.

Sierla, Eeva-Inkeri (1979). Patterns of interlending at the National Central Library for Technology. Helsinki: University of Technology Library, 1979. (Occasional Paper 36).

Smith, Malcolm D (1983). The costs of interlending activities. Interlending and Document Supply, 11(2), April 1983, 43-47.

Spencer, Carol C (1971). Random time sampling with self-observation for library cost studies: unit costs of interlibrary loans and photocopies of a regional medical library. Journal of the American Society for Information Science, 22(3), May-June 1971, 153-160.

Stone, Sue (1983). Inter-library loans: a study of the antecedents and outcomes of inter-library loan requests. Sheffield: Centre for Research on User Studies, 1983 (CRUS Occasional Paper 7).

Stone, Sue (1984). Quality control in inter-library loan services: some user perspectives. In Ford, Geoffrey (ed.) Inter-library lending: practice, politics and prospects. [London]: Rossendale, 1984. pp.53-73.

Stuart, M (1977). Some effects on library users of the delays in supplying publications. Aslib Proceedings, 29(1), January 1977, 35-45.

Taler, Izabella and Klapper, Paul (1982). Automated and manual ILL: time effectiveness and success rate. Information Technology and Libraries, 1(3), September 1982, 277-280.

Trier, G M van (1980). Het interbibliothecair leenverkeer in Nederland: onderzoekvapport. 's-Gravenhage: Bibliotheekraad Rijswijk, 1980 (Publikaties Bibliotheekraad 5).

Turock, Betty J. (1985). Performance factors in multiple library networking. Research Sharing and Information Networks, 3(1), 1985/86, 15-38.

Vickers, Stephen (1983). Assessing availability in individual countries. Unesco Journal of Information Science, Libraries and Archives Administration, 5(3), July-September 1983, 168-182.

Vinzent, Otwin (1978). Leihverkehr der deutschen Bibliotheken - Anlass zu Optimismus? In Die Hochschulbibliothek: Beitrage und Berichte, ed. Klaus-Dieter Lehmann and Hildegard Huttermann. Frankfurt-am-Main: Klostermann, 1978. pp.162-180.

Waldhart, Thomas J (1985). Performance evaluation of interlibrary loans in the United States: a review of research. Library and Information Science Research, 7(4), Oct-Dec 1985, 313-331.

White, Brenda (1986). Interlending in the United Kingdom 1985. [London]: The British Library, 1986. (Library and Information Research Report 44).